October 28, 1987

CD-87-13

Dear Manufacturer:

Subject: Implementation of the Video Driver's Aid System at the MVEL and Computer Entry of Shift Schedules

EPA intends to implement the Video Driver's Aid (VDA) System for use with all testing at the Motor Vehicle Emission Laboratory (MVEL) starting January 4, 1988. The VDA system was discussed at several manufacturers' meetings and a demonstration was conducted following the July 15, 1987 meeting. The VDA system uses a network of Apple MacIntosh Plus micro computers to calculate and display the driver's traces. This computer network is known as the Laboratory Network System (LNS).

For this system to operate the VDA system needs transmission shifting instructions (known as shift schedules) for each vehicle tested. This letter will discuss the procedures for entering shift schedules into EPA's computer database.

Shift schedules must be defined before a vehicle may be prepped for testing at MVEL. Separate shift schedules are required for city and highway driving schedules. Once shift schedules have been defined they will be kept on the LNS available for subsequent testing conducted at MVEL. EPA will require shift schedule data to be properly completed two (2) weeks in advance of any testing conducted at the MVEL.

Actual entry of the shift schedules will be accomplished through a computer interface called the Shift Schedule Information System (SSIS) which runs on the MTS computer system. Shift schedule data can be entered either by direct datasheet entry at the MVEL Computer Operations window or by electronic data transfer through the appropriate MTS data files. EPA will process the data, transfer it to the LNS/VDA computer system, and produce the final reports. The detailed instructions about how to submit shift schedules are specified in Enclosure I.

Manufacturers testing vehicles which use automatic transmissions or use standard shift patterns will not need to enter any shift schedules because EPA has developed the following standard shift schedules:

15-25-40-45 (for M3, M4, and M5 transmissions)
Automatic (for automatic transmissions)
SIL (for Shift Indicator Light transmissions where the light is followed on the test)

Manufacturers testing vehicles which use unique shift schedules can begin to submit their shift schedule definitions for processing on November 2, 1987.

We expect the computer definition process to normally take about one day to complete, however it may take longer in the beginning while everyone is attempting to define new shift schedules at the same time. We suggest that you perform pilot runs of one or two swift schedules before you submit the bulk of your data. This will allow everyone to receive processed data more quickly.

Once the shift schedule information has been entered into EPA's computer database the Vehicle Information (VI) Sheet should be updated to reference that shift schedule. Enclosure II contains a revised VI sheet and instructions for its completion.

EPA will conduct a workshop at the MVEL on the November 18, 1987 after the manufacturers' meeting. This workshop will focus on shift schedule data entry procedures and will be open to all manufacturers. If you have specific questions please submit them at least a week before the meeting; questions will also be taken from the floor.

If you have any questions concerning the Shift Schedule Information System, the data entry process, or the workshop please contact Mr. John Hendon (313-668-4383) of my staff.

Sincerely,

Robert E. Maxwell, Director
Certification Division
Office of Mobile Sources

Enclosures

7236b

ENCLOSURE I

XIII. SHIFT SCHEDULE INFORMATION SHEET PROGRAM

This enclosure contains a copy of a new chapter to be included in the certification Application Format Data Supplement. This enclosure explains how to submit data into the EPA Shift Schedule Information Sheet Program To submit data by means of electronic data transmission (This is ordinarily explained in Chapter I, which is not included here), manufacturers must create the following data files on their MTS account:

1219W --Input data file
1219R --Report file

After the files are created, the following commands can be used to give EPA permission to access the files

$PERMIT 1219W FULL (SAQM,SAQR)
$PERMIT 1219R FULL (SAQM,SAQR)

Note: Enclosure I only describes the submission of unique shift schedules and does not reference the standard shift schedules Special codes defined for standard shift schedules for manual (15-25-40-45) and automatic transmissions and use of

SIL are identified on the Vehicle Information Data Sheet (See Enclosure II)

XIII. SHIFT SCHEDULE INFORMATION SHEET PROGRAM

A. Introduction. Shift Schedule Information Sheets (Attachment XIII-1) are used to enter transmission shift schedules into the EPA Shift Schedule Data Base that is used to produce video driving traces for vehicle emission and fuel economy tests performed in the EPA laboratory. Topics discussed in this document have previously been addressed in the Certification Advisory Circular Number 72A (Cert. A/C No. 72A). Familiarity with Cert. A/C No. 72A is assumed.

B. Definitions:

VDA -The Video Driver's Aid.

LCS -The EPA Laboratory Computer System. The computer system used to monitor vehicle exhaust emissions at the EPA Motor Vehicle Emissions Laboratory in Ann Arbor.

LNS -The EPA Laboratory Network System. The Laboratory network system is comprised of all the VDA computers, an AST-4000 Hard disk drive, an Apple Laser Writer and Apple Image Writer II printers connected to form a local area network. The VDA computers communicate with other components of the system using the AppleTalk Communication and AppleShare file server software package.

MTS -The Michigan Terminal System. The computer operating system used by manufacturers to submit shift schedule data to EPA. EPA computer programs transfer shift schedule data to the LNS. The LNS and LCS are used to directly support vehicle emission and fuel economy tests at the EPA laboratory.

Drive schedule -A time versus speed schedule for use with a chassis dynamometer. Drive schedules can include cruise and non-cruise periods. Cruise and non-cruise periods are defined in Cert. A/C No 72A.

Shift Schedule -A vehicle transmission shifting specification. Shift schedules consist of shift patterns and shift point data.

Shift pattern -General speed versus gear-change specifications

which are defined in Cert. A/C No. 72A. The Certification Application Shift Patterns are to be submitted on the Shift Schedule Information Sheet. LNS software determines Calculated Shift Patterns from shift point information.

Shift points -A drive schedule time versus gear-change specification. Shift points specify when a vehicle transmission should be shifted during a particular drive schedule. Shift points require two items of information:

Shift time -Shift time is the time of a gear change during a drive schedule. Note that shift speed can be determined from shift time and the drive schedule.

Shift code -Shift code specifies the specific shift operation or action preformed by the driver.

Note: Organizations responsible for submitting correctly marked shift marks on strip-charts are responsible for submitting correct and valid shift schedules for use with the VDA.

C. System Overview. An illustration of the shift schedule information data flow is provided in Figure 1. The information flow will typically proceed as follows:

1. Shift schedule data can be submitted on data sheets or keypunch cards at the EPA Computer Operations input window at the EPA laboratory in Ann Arbor, or can be entered into an MTS line file on the manufacturer's MTS account.

2. The EPA Shift Schedule Information Sheet Program reads and

validates the shift schedule data submitted by the manufacturer and prints a preliminary report. When data is submitted by means of electronic data transmission, a preliminary report is copied to the end of the the manufacturer's report file. Reports are printed on the printer at the EPA laboratory when data is submitted at the input window.

3. If the shift schedule data does not contain a serious error, the Shift Schedule Information Sheet Program enters a copy of the shift schedule in the MTS Shift Schedule Data Base. A second copy is entered in an MTS-LNS transaction holding file for transmission to the EPA Laboratory Network System.

4. Periodically, shift schedules are electronically transmitted from MTS to LNS to be entered in the Laboratory Network System.

5. VDA software performs additional validation checks, calculates additional information for the shift schedule, enters the shift schedule in the LNS data files, and enters an updated copy of the shift schedule data in an LNS-MTS transaction holding file for transmission back to MTS.

6. Periodically, shift schedules are electronically transmitted from LNS to MTS to be reprocessed by the MTS Shift Schedule Information Sheet Program.

7. The EPA Shift Schedule Information Sheet Program reads and validates the Shift schedule data transmitted from LNS to MTS enters the data in the MTS data files, and prints a summary report that includes information calculated by the LNS. This data is not transmitted a second time from MTS to LNS. The summary report is written to the same file or device that the preliminary report is written to. As a result, manufacturers receive two reports for each successful transaction-- a preliminary report and a final report.

It is estimated that several days may be required to completely process one transaction. If transactions are updated (corrected, or

deleted) before another transaction for the same shift schedule has been processed through the entire system, the report could appear to be incorrect. Careful thought indicates that this is not likely to cause any problem beyond the confusion caused by the report printing order. For example, events could occur in the following order:

1. A manufacturer submits an initial shift schedule.

2. The MTS Shift Schedule Information Sheet Program prints a preliminary summary report and transmits the data to LNS.

3. The manufacturer submits an update for the shift schedule before the original data has returned from LNS.

4. The LNS VDA program processes the initial shift schedule and transmits it back to MTS.

5. The MTS Shift Schedule Information Sheet Program processes the manufacturer update, prints a preliminary summary report for the update, and transmits update data to LNS.

6. The MTS Shift Schedule Information Sheet Program processes the initial shift schedule returned from LNS and prints a final report for the initial shift schedule. The initial shift schedule from LNS replaces the preliminary updated shift schedule on MTS. This causes confusion because information from the update reported earlier is missing from this final report.

7, The LNS VDA program processes the update and transmits the final updated shift schedule back to MTS.

8. The MTS Shift Schedule Information Sheet Program processes the final updated shift schedule returned from LNS and prints a final report for the update.

In the preceeding example, the final results should be correct in spite of an apparent synchronization problem. Manufacturers will need to understand the overall data flow of the EPA Shift Schedule Information System and the delays that can occur in order to avoid confusion.

Cert Data Supplement XIII -Figure 1 --MTS-LNS Shift Schedule Information
Flow can be found in Document CD8713_1.PCX

SSIS

D. Error-Checking Performed. The Shift Schedule Information Sheet Program screens all submissions by performing the following error checks:

1. It confirms that all coded fields--PROCESS CODE, V.I. MANUFACTURER CODE, SHIFT SCHEDULE IDENTIFICATION NUMBER, etc. --contain input defined as valid by the instructions in Section XIII.F below:

2. It confirms that numeric fields are right justified and free of alphabetic characters. If any of these conditions are violated, the processing program will reject the submission and print an "Error Report" to identify exactly the nature of the problem. (For a sample "Error Report", see Attachment XIII-2).

E. Six Types of Data Sheet Submission. The Shift Schedule Information Sheet Program can perform six different transactions--"New", "Report", "Replace", "Correction", "Deletion", and "Change". Each transaction is described below:

1. "New" or New Entry Submission: A "new" Data Sheet is used to enter data into the Shift Schedule Data Base for the first time. To prepare a "new" entry:

a. Enter a blank or "0" value in the PROCESS CODE Field (Card S1, Col 6).

b. Fill in all fields according to the instructions provided in Section XIII.F below.

c. Enter an "SEND" card to end this transaction. Note: "SEND" must be entered starting in column 1.

2. _"Report" Submission: Reports can be produced for one shift

schedule. To produce a report, submit a "Report" Data Sheet:

a. Enter a character n 1 n in the PROCESS CODE Field (Card S1, Col 6).

b. Fill in the key fields: MANUFACTURER CODE and SHIFT SCHEDULE IDENTIFICATION NUMBER on Card S1 to identify the shift schedule that is to be reported.

c. Enter an "SEND" card to end this transaction.

3. "Replace" Submission: A "new" Data Sheet is used to replace an entire data set in the Shift Schedule Data Base. The Shift Schedule Information Sheet Program will not allow replacement to take place if tests have been processed that use the shift schedule. To prepare a "replace" entry:

a. Enter value "2" in the PROCESS CODE Field (Card S1, Col 6).

b. Enter the SHIFT SCHEDULE IDENTIFICATION NUMBER (and V.I. MANUFACTURER CODE) of the shift schedule that is to be replaced.

c. Enter all remaining information that would be required for a "New Entry" submission.

4. "Correction" Submission: Correction submissions are used to correct erroneous data or update an existing shift schedule. With the exception of the CERT MODEL YEAR field, the Shift Schedule Information Sheet Program will not allow correction to take place if tests have been processed that use the shift schedule. To submit a correction submission:

a. Enter a character "3" in the PROCESS CODE Field (Card

S1, Col 6).

b. Fill in the key fields: MANUFACTURER CODE and SHIFT SCHEDULE IDENTIFICATION NUMBER on Card S1 to identify the shift schedule to be corrected or updated.

c. Fill in (correctly) the remaining fields which are to be altered. Unlike other EPA programs, this program does not allow column-by-column correction. Each field is replaced on a field-by-field basis. If an input field is blank, the original value will not be changed. To blank a field, enter an asterisk "*" in at least one column of the field. All columns in the field will then be blanked. If an asterisk is entered in a field, any other character in the field will be ignored.

d. Enter an "SEND" card to end this transaction.

5. "Deletion" Submission: If an entire drive schedule needs to be deleted, submit a "Deletion" Data Sheet. The Shift Schedule Information Sheet Program will not allow deletion to take place if tests have been processed that use the shift schedule. To submit a Deletion submission:

a. Enter a character "4" in the PROCESS CODE Field (Card S1, Col 6).

b. Fill in the key fields: MANUFACTURER CODE and SHIFT SCHEDULE IDENTIFICATION NUMBER on Card S1 to identify the

shift schedule to be deleted.

c. Enter an "SEND" card to end this transaction.

6. "Change" Submission: The Change submission is used to create a new modified shift schedule that Is based on an existing schedule. This transaction copies an existing shift schedule to a new shift schedule, assigns a new Shift Schedule Identification Number, and allows the user to make corrections in the same way that corrections are made by means of the "Correction" process code. To submit a "Change" data sheet:

a. Enter a character "5" in the PROCESS CODE Field (Card S1, Col 6).

b. Fill in the key fields: MANUFACTURER CODE and SHIFT SCHEDULE IDENTIFICATION NUMBER on Card S1 to identify the shift schedule to be copied.

c. Correct any fields that require modification. The procedure is the same as the procedure used for "Correction" transactions.

d. Enter an "SEND" card to end this transaction.

F. Input Field Descriptions. All shift schedules must include the following data as a minimum:

Input card S1:
--Vehicle information manufactuer code in cols 12-14
--Shift schedule identification number in cols 16-19 (assigned by the program for a "New" entry).

Input card S3:
--Declutch speed
--1 to 2 gear shift speeds

Input card S7:
--An S7 card must be present and must have a valid drive schedule name code in columns 4-6.

Input card SEND

** Card S1 **

The "S1" card is used to identify shift schedules. One "S1" card must be submitted for each transaction.

Cols 1-2 --Card Type Code S1

Enter "S1" to identify the data card. This field is always required.

Cols 6-6 --Process Code

.

Enter one of the following codes to specify the type of processing that should occur:

Code	Process
blank or 0	--New entry
1	--Report
2	--Replace data set
3	--Correct data set
4	--Delete data set

5 --Change

This field is always required.

Cols 12-14 --Manufacturer Code

Enter the three digit Vehicle Information Manufacturer Code for the manufacturer that can be found on the back of the Vehicle Information Data Sheet. This field is always required.

Cols 16-19 --Shift Schedule Identification Number

The SSIS program will assign the Shift Schedule Identification Number when a "New" shift schedule is being defined because PROCESS CODE IS "0" or blank (New entry). This value must be entered for all other process codes. When PROCESS CODE is "5" (Change) the SSIS program will assign a new Shift Schedule Identification Number to the new shift schedule created by the program.

Cols 21-48 --Shift Schedule Description

Enter a brief text description of the shift schedule. For example, manufacturers can enter the shift schedule name used at the manufacturer's facility.

** Card 52 **

The "S2" card is used by vehicle manufacturers for the purpose of entering the Data Set Originator Code. Other codes on in this card are used internally by EPA software and personnel.

Cols 1-2 --Card Type Code -S2

Enter "S2" to identify the data card. Although the "S2" card is optional, this field is always required when an "S2" card is submitted.

Cols 18-19 --Data Set Originator Code

Enter one of the following codes to indicate who originated the shift schedule (EPA, manufacturer, etc.). This field must be provided for each schedule.

Code	Originator
1	--Manufacturer
10	--EPA (Cert)
11	--EPA (EOD)
12	--EPA (MOD)
13	--EPA (FOSD)
14	--EPA (ECTD)
99	--Other

** Card S3 **

The "S3" card is used to enter the non-cruise shift pattern information from the Certification Application. This information must be provided for each shift schedule used for certification.

Cols 1-2 --Card Type Code -S3

Enter "S3" to identify the data card. Although the "S3" card is optional for a particular transaction, this field is always required when an "S3" card is submitted.

Cols 4-7 --Cert Application Non-Cruise Period Declutch Speed

Enter the Non-Cruise declutch speed. The declutch speed must be less than or equal to the 1 to 2 gear shift speed. This field is required for certification if a non-cruise declutch can occur during a test.

Cols 9-12 --Cert Application Non-Cruise 1 to 2 gear shift speed

Enter the Non-Cruise 1 to 2 gear shift speed. The driver shifts from 1 to 2 when this speed is exceeded. This field is required for certification if a non-cruise 1 to 2 gear change can occur during a test.

Cols 14-17 --Cert Application Non-Cruise 2 to 3 gear shift speed

Enter the Non-Cruise 2 to 3 gear shift speed. The driver shifts from 2 to 3 when this speed is exceeded. This field is required for certification if a non-cruise 2 to 3 gear change can occur during a test.

Cols 19-22 --Cert Application Non-Cruise 3 to 4 gear shift speed

Enter the Non-Cruise 3 to 4 gear shift speed. The driver shifts from 3 to 4 when this speed is exceeded. This field is required for certification if a non-cruise 3 to 4 gear change can occur during a test.

Cols 24-27 --Cert Application Non-Cruise 4 to 5 gear shift speed

Enter the Non-Cruise 4 to 5 gear shift speed. The driver shifts from 4 to 5 when this speed is exceeded. This field is required for certification if a non-cruise 4 to 5 gear change can occur

during a test.

Cols 29-32 --Cert Application Non-Cruise 5 to 6 gear shift speed

Enter the Non-Cruise 5 to 6 gear shift speed. The driver shifts from 5 to 6 when this speed is exceeded. This field is required for certification if a non-cruise 5 to 6 gear change can occur during a test.

** Card S4 **

The "S4" card is used to enter the cruise shift pattern information from the Certification Application. This information must be provided for each shift schedule. Cruise patterns must specify as many gears as the corresponding non-cruise pattern.

Cols 1-2 --Card Type Code -S4

Enter "S4" to identify the data card. Although the "S4" card is optional for a particular transaction, this field is always required when an "S4" card is submitted.

Cols 4-7 --Cert Application Cruise Period Declutch Speed

Enter the Cruise declutch speed. This field is required for each shift schedule. This field is required for certification if a cruise declutch can occur during a test.

Cols 9-12 --Cert Application Cruise 1 to 2 gear shift speed

Enter the Cruise 1 to 2 gear shift speed. The driver shifts from 1 to 2 when this speed is exceeded. This field is required for certification if a cruise 1 to 2 gear change can occur during a test.

Cols 14-17 --Cert Application Cruise 2 to 3 gear shift speed

Enter the Cruise 2 to 3 gear shift speed. The driver shifts from 2 to 3 when this speed is exceeded. This field is required

for certification if a cruise 2 to 3 gear change can occur during a test.

Cols 19-22 --Cert Application Cruise 3 to 4 gear shift speed

Enter the Cruise 3 to 4 gear shift speed. The driver shifts from 3 to 4 when this speed is exceeded. This field is required for certification if a cruise 3 to 4 gear change can occur during a test.

Cols 24-27 --Cert Application Cruise 4 to 5 gear shift speed

Enter the Cruise 4 to 5 gear shift speed. The driver shifts from 4 to 5 when this speed is exceeded. This field is required for certification if a cruise 4 to 5 gear change can occur during a test.

Cols 29-32 --Cert Application Cruise 5 to 6 gear shift speed

Enter the Cruise 5 to 6 gear shift speed. The driver shifts from 5 to 6 when this speed is exceeded. This field is required for certification if a cruise 5 to 6 gear change can occur during a test.

** Card S7 **

The "S7" card is used to identify the drive schedule that is associated with the shift schedule. Card S7 must be submitted for each Shift schedule.

Cols 1-2 --Card Type Code -S7

Enter "S7" to identify the data card. This field is always required when an "S7" card is submitted.

Cols 4-6 --DSN Code (Drive Schedule Name Code)

Enter one of the Drive Schedule Name Codes listed below. Only DSN code 2 and 3 may be used for certification.

Code	Drive Schedule Name
2	--FTP(Cert)
3	--HWFE(Cert)
21	--LA4(preponly)
22	--LA4
23	--505
31	--HWFE(nowarmup)
101	--SCC#1
102	--SCC#2
103	--BIH(Auto)
104	--BIH(Manual)
111	--3BagHWFE
112	--3Bag505
121	--LA4(perturbed1.5)

** Card S8 **

The "S8" card is used to specify the Cert model years that can use

this schedule for certification testing. This information is required for certification. A model year must be specified before the shift schedule can be used for an EPA certification test for the model year. A maximum of twelve model years can be specified for one shift schedule. One "S8" card must be submitted for each model year.

Unlike most shift schedule information, which cannot be modified once the shift schedule has been used for an EPA test, model years can be added by users after a shift schedule has been used. Model years can also be deleted by a user after a shift schedule has been used if the shift schedule was never used to support an EPA certification for the model year to be deleted.

Cols 1-2 --Card Type Code -S8

Enter "S8" to identify the data card. Although the "S8" card is optional for a particular transaction, this field is always required when an "S8" card is submitted.

Cols 4-7 --Model Year

Enter the model year for which the shift schedule is active. This information must be provided before the shift schedule can be used for EPA certification testing.

Cols 9-9 --Delete

The DELETE field is used to delete model years for process code "3" (Correction) or "5" (Change) transactions. To delete a model year, submit the "S8" card with the MODEL YEAR field entered and enter "D" in the DELETE field.

** Card SC **

The "SC" card is used to enter optional comments into the drive schedule. A maximum of ten comment records can be submitted. If a nonblank comment record is submitted for process code "3" (Correction) or "5" (Change), all previous comment records will be deleted.

Cols 1-2 --Card Type Code -SC

.

Enter "SC" to identify the data card. Although the "SC" card is optional for a particular transaction, this field is always required when an "SC" card is submitted.

Cols 3-80 --Comment

Enter a comment in columns 3-80. This field is not required.

** Card SP **

The "SP" card is used to enter shift point specifications into the shift schedule. A maximum of 160 shift point records can be submitted for one shift schedule.

Cols 1-2 --Card Type Code -SP

Enter "SP" to identify the data card. Although the "SP" card is optional for a particular transaction, this field is always required when an "SP" card is submitted.

Cols 3-5 --Shift Point #

Shift Point Numbers are assigned or reassigned by the SSIS program whenever a shift schedule is entered or corrected.

Entered Shift Point Numbers are used by the SSIS program to identify shift points that are to be modified during correction. Enter the Shift Point Number if shift point information is being modified for a Process Code "3" (Correction) or "5" (Change). The SSIS program will only correct a shift point if the Shift Point Number and Shift Time match an existing value in the shift schedule. Shift Point Number will be ignored by the SSIS program when a shift point is added to a shift schedule.

Shift Point Numbers should be right justified.

Cols 7-12 --Shift Time

Enter SHIFT TIME. Values should be entered with a 1/10 second resolution, based on the drive schedule specified on card "S7". This field is always required for Shift Point Cards. To correct Shift Time, it is necessary to delete the shift point that has the incorrect time an add a new shift point with the correct time.

Cols 19-20 --Shift Action Code

Enter one Of the following codes to specify the action to be executed: -

Code	Description	Default VDA Screen Text
"00"	--Declutch	" "
10	--Declutch	" "
20	--Declutch	" "
30	--Declutch	" "
40	--Declutch	" "
50	--Declutch	" "
60	--Declutch	" "
12	--upshift 1 to 2	"2 "
23	--upshift 2 to 3	"3 "
34	--upshift 3 to 4	"4 "
45	--upshift 4 to 5	"5 "
56	--upshift 5 to 6	"6 "
65	--downshift 6 to 5	" 5 " (Note 1)

```
 54 --downshift 5 to 4           "    4      " (Note 1 )
43 --downshift 4 to 3          "    3      " (Note 1 )
 32 --downshift 3 to 2          "    2      " (Note 1 )
 21 --downshift 2 to 1           "   1      " (Note 1 )
 64 --down-skipshift 6 to 4      "    4 dss  " (Note 1 )
 63 --down-skipshift 6 to 3      "    3 dss  " (Note 1 )
 62 ~~ down-skipshift 6 to 2      "    2 dss  " (Note 1 )
 61 --down-skipshift 6 to 1      "    1 dss  " (Note 1 )
 53 --down-skipshift 5 to 3      " 3 dss " (Note 1)
 52 --down-skipshift 5 to 2      " 2 dss " (Note 1 )
 51 --down-skipshift 5 to 1      " 1 dss " (Note 1)
 42 --down-skipshift 4 to 2      " 2 dss " (Note 1 )
 41 --down-skipshift 4 to 1      " 1 dss " (Note 1)
 31 --down-skipshift 3 to 1      " 1 dss " (Note 1 )
 97 --use shift indicator light  "use SIL "
 98 --creeper gear               " creeper "
 99 --alternative comment       "xxxxxxxxx" (Note 2)
 ** --delete shift point                   (Note 3)
```

Note 1: An arrow pointing left is drawn by the VDA.

Note 2: "xxxxxxxxx" = 9-character Shift Point Screen Text specified on this "SP" card.

Note 3: To delete a shift point, enter SHIFT POINT NUMBER, SHIFT TIME, and asterisks in the SHIFT ACTION CODE field.

Cols 22-30 -- Shift Point Screen Text

Enter the shift point screen text to be displayed on the driver's trace if the SHIFT ACTION CODE on this card equals 99. This field is optional.

Cols 36-36 ---Exception Point

Enter one of the following codes:

Code Meaning

blank --Include this shift point speed in VDA shift pattern calculations.

"Y" -- Do not include this shift point speed in VDA shift pattern calculations.

** Card SEND **

The "SEND" card is used to identify the end of a shift schedule data set. The "SEND" card is required for all transactions.

Cols 1-4 --Card Type Code -SEND

Enter "SEND" to identify the data card. This field is always required.

G. Program Limits. The following table provides a summary of current limits imposed by the MTS Shift Schedule Information Sheet Program for Certification. Maximum and minimum values are provided for a single transaction and a single shift schedule.

	-----Certification Limits For -----			
	One Transaction		One Shift Schedule	
	Minimum	Maximum	Minimum	Maximum
Number of "S1" cards	1	1	1	1
V.I. Manufacturer Code	10	999	10	999
Shift Schedule Id Number	1(1)	9999	1	9999
Number of "S2" cards	0	1	1	1
Number of "S3" cards (2)	0	1	1	1
Number of "S4" cards (2)	0	1	1	1
Number of "S7" cards	0	1	1	1
Number of "S8" cards (2)	0	12	1	12
Number of "SC" cards	0	10	0	10
Number of "SP" cards (2)	0	160	>0	160
Shift time (seconds)	0.0	2500.0	0.0	2500.0
Number of "SEND" cards				

Notes: (1). Shift Schedule I.D. Number should be blank for "New entry' process code; the program will assign a value.

(2). Optional for Non-Certification.

H. MTS and VDA Error Processing.

1. Error severity. Error messages are assigned an error number and an error severity. Each message is explained below in the order of the error numbers. Error severity is assigned values zero through five. The number of asterisks printed on the beginning of each error or warning message indicates error severity. The significance of the different levels of error severity are:

WARNING: Warning conditions are severity level zero conditions that identify a possible problem that may require investigation, but that do not prevent processing the transaction through this program. In addition, manufacturers tests that use data from the transaction that generated the warning condition may be processed through the Shift Schedule Information Sheet Program without complaint. Most warning conditions occur when the program discovers a possible minor problem in EPA software or data that may require

correction, but that does not have an effect on the transaction being processed.

* ERROR: A * (one-star) ERROR identifies a severity level one error. This error is a definite error; however, it is minor enough to allow processing, including test processing, to proceed. Examples of severity level one errors are minor violations of tolerance limits.

** ERROR: A ** (two-star) ERROR identifies an error of severity level two that prevents test processing, but that does not prevent update of the Shift Schedule Data Base. Missing or invalid data can generate severity level two errors.

*** ERROR: A *** (three-star) ERROR identifies a severity level three error. This is a relatively serous error that prevents processing the transaction; however, enough good information is available to print a standard result report, including an explanation of errors. Report transactions are terminated if a *** ERROR occurs.

**** ERROR: A **** (four-star) ERROR identifies a severity level four error. Severity level four errors are serious enough to prevent processing the transaction and prevent printing a standard result report as well. When a severity level four error occurs, the program will attempt to produce a special error report that prints the input data and an explanation of the problem. Severity level four errors usually occur when the program cannot identify input cards that make up a complete transaction.

***** ERROR: A ***** (five-star) ERROR identifies a severity level five error. Severity level five errors identify very serious problems that prevent processing. Severity level five errors are usually caused by errors in computer equipment, the program, system

(MTS) software, EPA data files, or by an inability to access user (manufacturer) data. When a severity level five error occurs, the program will first attempt to produce a special error report that prints the input data and an explanation of the problem. The program will then terminate execution. Users should usually notify someone in the Certification Division, Computer Support Section if a severity level five error occurs. An important exception is when execution is terminated because the user has not provided access to user-owned data files. If this occurs, the user should provide appropriate access and resubmit the input data.

I. LNS-VDA Error_ Processing. VDA error message processing is described below. For each message, a message number is printed, an error severity, and the message itself, followed by an explanation.

000 No unusual or erroneous conditions have been identified.

This self explanatory message is printed when no error messages are printed. This message does not indicate that shift instruction data sets are without problems.

001 *** S1 Shift Schedule Identification Record missing.

This message is printed when the VDA program receives a shift instruction dataset that is missing the Shift Schedule Identification record (card S1).

002 ** SP xxx Unrecognized sequence of shift action codes detected.

This message is printed whenever a shift action code pair contains codes that do not connect. A shift action code pair is two shift action codes adjacent in time within a shift schedule.

In connected codes, the target gear of a first shift code, must match the source gear of a second shift code (12 followed by 23, 23 followed by 34, etc.) . No attempt to print an error message is made when declutch codes or codes, 97, 98, and 99 are used as one of the codes in a shift action code pair.

003 ***** Unusual or erroneous conditions have been identified.

This informational error message could be printed whenever error message 0 is not printed. It has been disabled.

004 * SP xxx Less than 2 seconds between shift points.

This message is printed whenever a shift action code pair contains time values less than two seconds apart. A shift action code pair is two shift action codes adjacent in time within a shift schedule.

005 ** SP xxx Unrecognized shift action code.

This message is printed whenever a shift action code is encountered that is not a member of the standard code list. Valid shift action codes have been included with the Shift Instruction Data Sheet.

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006 * SP xxx Shift Points with time beyond end of test present.

This warning message is printed whenever shift points with time values beyond the end of the drive schedule are included with shift instructions. Example: A valid FTP (1870 seconds) shift schedule may also be used with a 505 (505 seconds) drive schedule. In this case, this message is not indicating a problem.

007 * SP xxx Less than 2 seconds between shift points.

This message is printed whenever a shift action code pair contains time values less than two seconds apart. A shift action code pair is two shift action codes adjacent in time within a shift schedule. Message 007 is produced if the error condition is diagnosed during test scheduling, while similar message 004 is produced if the error condition is diagnosed during VDA preliminary processing.

008 ** SP xxx Unrecognized shift action code.

This message is printed whenever a shift action code is

encountered that is not a member of the standard code list. Valid shift action codes have been included with the Shift Instruction Data Sheet. Message 008 is produced if the error condition is diagnosed during test scheduling, while similar message 005 is produced if the error condition is diagnosed during VDA preliminary processing.

009 * SP xxx Shift Points with time beyond end of test present.

This warning message is printed whenever shift points with time values beyond the end of the drive schedule are included with shi instructions. Example: A valid FTP (1870 seconds) shift schedule may also be used with a 505 (505 seconds) drive schedule. In this case, this message is not indicating a problem.

010 *** 53 non-cruise pattern record missing.

This message is printed whenever the VDA receives a shift instruction set that does not include a non-cruise pattern record.

011 *** 53 Low gear shift speed must be lower than high gear shift speed.

This message is printed when a impossible sequence of shift speeds in entered into the non-cruise pattern record.

012 * S4 Cruise pattern record is missing.

This message is printed only when a SHFT Shifting Schedule does not have a S4 Cruise Pattern record.

013 * S4 Cruise pattern duplicated from S3 non-cruise pattern.

This message is printed only when a TEXT Shifting instructions do not have a S4 Cruise Pattern record. In this case, the 53 record is duplicated to create a S4 record.

014 *** S3 Low gear shift speed must be lower than high gear shift speed.

This message is printed when a impossible sequence of shift speeds in entered into the cruise pattern record.

015 *** S4 cruise speed must be <= non-cruise speed for same gear.

This message is printed whenever a cruise pattern shift speed, for a single gear, is found to be greater that the corresponding non-cruise patter shift speed for the same gear.

016 * S7 Drive Schedule Name Record is not present.

This message is printed whenever no 57 record is included with a shift instruction data set.

017 *** Invalid Drive Schedule Name Code.

This message is printed whenever an unrecognized drive schedule name code is found in the S7 (Drive Schedule Name) record.

018 * Drive schedule -shifting schedule combination is not default

This message is printed whenever a acceptable, but not default, drive schedule is selected for usage with a shift schedule.

019 *** Unrecognized drive schedule name.

This message is printed whenever a a drive schedule name, that, is not recognized by the VDA program, is selected for usage in conjunction with a shifting schedule.

020 *** Unusual drive schedule -shifting schedule combination.

This message is printed whenever a VDA recognized, but non-standard drive schedule is selected for use in conjunction with a shifting schedule.

J. MTS Error Processing. MTS error message processing is described below. For each message, a message number is printed, an error severity, and the message itself. An explanation of the messages will be added in the future.

**** MTS ERROR 1000: INVALID CARD TYPE CODE, NOT "S1", "S2", ... , OR "SEND". THIS TRANSACTION WILL NOT BE PROCESSED.

**** MTS ERROR 1001: NO INPUT DATA SUBMITTED. THIS TRANSACTION WILL NOT BE PROCESSED.

***** MTS ERROR 1002: NUMBER OF INPUT CARDS WITHOUT "SEND" CARD EXCEEDS PROGRAM LIMIT. EXECUTION WILL TERMINATE.

**** MTS ERROR 1003: SHIFT SCHEDULE NOT IN SHIFT SCHEDULE DATA BASE. THIS TRANSACTION WILL NOT BE PROCESSED.

**** MTS ERROR 1004: DATA BASE ERROR--DATA BASE SHIFT SCHEDULE DOES NOT INCLUDE "SEND" RECORD. THIS TRANSACTION WILL NOT BE PROCESSED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

***** MTS ERROR 1005: SOFTWARE OR DATA BASE ERROR--I/O ERROR ATTEMPTING TO READ SHIFT SCHEDULE DATA FILE. EXECUTION WILL BE TERMINATED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

***** MTS ERROR 1006: SOFTWARE OR DATA BASE ERROR--NUMBER OF DATA BASE SHIFT SCHEDULE RECORDS EXCEEDS PROGRAM LIMIT. EXECUTION WILL BE TERMINATED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER COMPUTER SUPPORT SECTION.

***** MTS ERROR 1007: SOFTWARE OR DATA BASE ERROR--I/O ERROR ATTEMPTING TO READ SHIFT SCHEDULE HEADER RECORD. EXECUTION WILL BE TERMINATED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER COMPUTER SUPPORT SECTION.

***** MTS ERROR 1008: SOFTWARE OR DATA BASE ERROR--I/O ERROR ATTEMPTING TO READ LAST SHIFT SCHEDULE NUMBER IN SHIFT SCHEDULE HEADER RECORD. EXECUTION WILL BE TERMINATED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

***** MTS ERROR 1009: SOFTWARE OR DATA BASE ERROR--I/O ERROR ATTEMPTING TO WRITE SHIFT SCHEDULE HEADER RECORD. EXECUTION WILL BE TERMINATED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

***** MTS ERROR 1010: SOFTWARE OR DATA BASE ERROR--I/O ERROR ATTEMPTING TO WRITE SHIFT SCHEDULE RECORD. EXECUTION WILL BE TERMINATED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

***** MTS ERROR 1011: SOFTWARE OR DATA BASE ERROR--I/O ERROR ATTEMPTING TO READ REPORT PAGE l TEXT FILE.. EXECUTION WILL BE TERMINATED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

***** MTS ERROR 1012: SOFTWARE OR DATA BASE ERROR--END OF FILE ATTEMPTING TO READ REPORT PAGE 1 TEXT FILE.. EXECUTION WILL BE TERMINATED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

***** MTS ERROR 1013: SOFTWARE OR DATA BASE ERROR--I/O ERROR ATTEMPTING TO READ REPORT PAGE 2 TEXT FILE.. EXECUTION WILL BE TERMINATED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

***** MTS ERROR 1014: SOFTWARE OR DATA BASE ERROR--END OF FILE ATTEMPTING TO READ REPORT PAGE 2 TEXT FILE.. EXECUTION WILL BE TERMINATED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

***** MTS ERROR-1015: SOFTWARE OR DATA BASE ERROR--I/O ERROR ATTEMPTING TO READ REPORT PAGE 3 TEXT FILE.. EXECUTION WILL BE TERMINATED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

***** MTS ERROR 1016: SOFTWARE OR DATA BASE ERROR--END OF FILE ATTEMPTING TO READ REPORT PAGE 3 TEXT FILE.. EXECUTION WILL BE TERMINATED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

**** MTS ERROR 11000: "S1" SHIFT SCHEDULE IDENTIFICATION CARD NOT ENTERED. THIS TRANSACTION WILL NOT BE PROCESSED.

**** MTS ERROR 11001: MORE THAN ONE "S1" SHIFT SCHEDULE IDENTIFICATION CARD ENTERED. THIS TRANSACTION WILL NOT BE PROCESSED.

**** MTS ERROR 11002: DATA BASE ERROR--"S1" SHIFT SCHEDULE IDENTIFICATION RECORD MISSING FROM DATA BASE SHIFT SCHEDULE. THIS TRANSACTION WILL NOT BE PROCESSED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

**** MTS ERROR 11003: DATA BASE ERROR--MORE THAN ONE "51" SHIFT SCHEDULE IDENTIFICATION RECORD FOR DATA BASE SHIFT SCHEDULE. THIS TRANSACTION WILL NOT BE PROCESSED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

*** MTS ERROR 11020: SHIFT INSTRUCTIONS SET TYPE NOT ENTERED. THIS TRANSACTION WILL NOT BE PROCESSED.

MTS WARNING 11021: SHIFT INSTRUCTIONS SET TYPE SHOULD NOT BE ENTERED. THIS ENTRY WILL BE IGNORED.

*** MTS ERROR 11024: INVALID CODE FOR SHIFT INSTRUCTIONS SET TYPE. THIS TRANSACTION WILL NOT BE PROCESSED.

MTS WARNING 11025: CANNOT CORRECT SHIFT INSTRUCTIONS SET TYPE AFTER SCHEDULE USED FOR TEST. ENTRY WILL BE IGNORED.

**** MTS ERROR 11034: INVALID CODE FOR PROCESS CODE. THIS TRANSACTION WILL NOT BE PROCESSED.

*** MTS ERROR 11040: REPORT ROUTING NOT ENTERED. THIS TRANSACTION WILL NOT BE PROCESSED.

*** MTS ERROR 11041: REPORT ROUTING SHOULD NOT BE ENTERED. THIS TRANSACTION WILL NOT BE PROCESSED.
*** MTS ERROR 11042: INVALID NUMERIC FIELD FOR REPORT ROUTING. THIS TRANSACTION WILL NOT BE PROCESSED.

*** MTS ERROR 11043: REPORT ROUTING OUT OF TOLERANCE XXXX-XXXX THIS TRANSACTION WILL NOT BE PROCESSED.

*** MTS ERROR 11044: INVALID CODE FOR REPORT ROUTING. THIS TRANSACTION WILL NOT BE PROCESSED.

MTS WARNING 11051: FILE VERSION NUMBER/CODE SHOULD NOT BE ENTERED. THIS ENTRY WILL BE IGNORED.

**** MTS ERROR 11060: V.I. MANUFACTURER CODE NOT ENTERED. THIS TRANSACTION WILL NOT BE PROCESSED.

**** MTS ERROR 11062: INVALID NUMERIC FIELD FOR V.I. MANUFACTURER CODE. THIS TRANSACTION WILL NOT BE PROCESSED.

**** MTS ERROR 11063: V.I. MANUFACTURER CODE OUT OF TOLERANCE 10-999. THIS TRANSACTION WILL NOT BE PROCESSED.

**** MTS ERROR 11064: INVALID CODE FOR V.I. MANUFACTURER CODE. THIS TRANSACTION WILL NOT BE PROCESSED.

***** MTS ERROR 11066: I/O ERROR ATTEMPTING TO READ EPA DATA CODES FILE SAQE:1001D. EXECUTION WILL BE TERMINATED. PLEASE SHOW THIS TO SOMEONE IN THE CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

***** MTS ERROR 11067: SOFTWARE ERROR--ATTEMPT TO CALL SHIFT SCHEDULE ACCESS ROUTINE WITH INVALID V.I. MANUFACTURER CODE. EXECUTION WILL BE TERMINATED. PLEASE SHOW THIS TO SOMEONE IN THE CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

**** MTS ERROR 11070: SHIFT SCHEDULE ID NOT ENTERED. THIS TRANSACTION WILL NOT BE PROCESSED.

**** MTS ERROR 11071: SHIFT SCHEDULE ID SHOULD NOT BE ENTERED. THIS TRANSACTION WILL NOT BE PROCESSED.

**** MTS ERROR 11072: INVALID NUMERIC FIELD FOR SHIFT SCHEDULE ID. THIS TRANSACTION WILL NOT BE PROCESSED.
**** MTS ERROR 11073: SHIFT SCHEDULE ID OUT OF TOLERANCE 1-9999. THIS TRANSACTION WILL NOT BE PROCESSED.

***** MTS ERROR 11077: SOFTWARE ERROR--ATTEMPT TO CALL SHIFT SCHEDULE ACCESS ROUTINE WITH INVALID SHIFT SCHEDULE ID. EXECUTION WILL BE TERMINATED. PLEASE SHOW THIS TO SOMEONE IN THE CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

*** MTS ERROR 11080: SHIFT INSTRUCTIONS SET DESCRIPTION NOT ENTERED. THIS TRANSACTION WILL NOT BE PROCESSED.

*** MTS ERROR 11081: SHIFT INSTRUCTIONS SET DESCRIPTION SHOULD NOT BE ENTERED. THIS TRANSACTION WILL NOT BE PROCESSED.

MTS WARNING 11025: CANNOT CORRECT SHIFT INSTRUCTIONS SET DESCRIPTION AFTER SCHEDULE USED FOR TEST. ENTRY WILL BE IGNORED.

*** MTS ERROR 11090: LNS FILE NAME NOT ENTERED. THIS TRANSACTION WILL NOT BE PROCESSED.

MTS WARNING 11091: LNS FILE NAME SHOULD NOT BE ENTERED. THIS ENTRY WILL BE IGNORED.

*** MTS ERROR 12000: "S2" SHIFT SCHEDULE STATUS CARD NOT ENTERED. THIS TRANSACTION WILL NOT BE PROCESSED.

**** MTS ERROR 12001: MORE THAN ONE "S2" SHIFT SCHEDULE STATUS CARDS ENTERED. THIS TRANSACTION WILL NOT BE PROCESSED.

**** MTS ERROR 12002: DATA BASE ERROR--"S2" SHIFT SCHEDULE STATUS RECORD MISSING FROM DATA BASE SHIFT SCHEDULE. THIS TRANSACTION WILL NOT BE PROCESSED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

**** MTS ERROR 12003: DATA BASE ERROR--MORE THAN ONE "S2" SHIFT SCHEDULE STATUS RECORD FOR DATA BASE SHIFT SCHEDULE. THIS TRANSACTION WILL NOT BE PROCESSED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

MTS WARNING 12021: MTS ERROR SEVERITY SHOULD NOT BE ENTERED. THIS ENTRY WILL BE IGNORED.

MTS WARNING 12031: LNS ERROR SEVERITY SHOULD NOT BE ENTERED. THIS ENTRY WILL BE IGNORED.

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*** MTS ERROR 12041: EOD DISPOSITION SHOULD NOT BE ENTERED. THIS TRANSACTION WILL NOT BE PROCESSED.

*** MTS ERROR 12042: INVALID NUMERIC FIELD FOR EOD DISPOSITION. THIS TRANSACTION WILL NOT BE PROCESSED.

*** MTS ERROR 12044: INVALID CODE FOR EOD DISPOSITION. THIS TRANSACTION WILL NOT BE PROCESSED.

*** MTS ERROR 12051: CERT DISPOSITION SHOULD NOT BE ENTERED. THIS TRANSACTION WILL NOT BE PROCESSED.

*** MTS ERROR 12052: INVALID NUMERIC FIELD FOR CERT DISPOSITION. THIS TRANSACTION WILL NOT BE PROCESSED.

*** MTS ERROR 12054: INVALID CODE FOR CERT DISPOSITION. THIS TRANSACTION WILL NOT BE PROCESSED.

*** MTS ERROR 12061: ECTD DISPOSITION SHOULD NOT BE ENTERED. THIS TRANSACTION WILL NOT BE PROCESSED.

*** MTS ERROR 12062: INVALID NUMERIC FIELD FOR ECTD DISPOSITION. THIS TRANSACTION WILL NOT BE PROCESSED.

*** MTS ERROR 12064: INVALID CODE FOR ECTD DISPOSITION. THIS TRANSACTION WILL NOT BE PROCESSED.

*** MTS ERROR 12071: MOD DISPOSITION SHOULD NOT BE ENTERED. THIS TRANSACTION WILL NOT BE PROCESSED.

*** MTS ERROR 12072: INVALID NUMERIC FIELD FOR MOD DISPOSITION. THIS TRANSACTION WILL NOT BE PROCESSED.

*** MTS ERROR 12074: INVALID CODE FOR MOD DISPOSITION. THIS

TRANSACTION WILL NOT BE PROCESSED.

*** MTS ERROR 12081: MFR DISPOSITION SHOULD NOT BE ENTERED. THIS TRANSACTION WILL NOT BE PROCESSED.

* MTS ERROR 12082: INVALID NUMERIC FIELD FOR MFR DISPOSITION. THIS ENTRY WILL BE IGNORED.

* MTS ERROR 12084: INVALID CODE FOR MFR DISPOSITION. THIS ENTRY WILL BE IGNORED.

* MTS ERROR 12090: DATA SET CREATOR NOT ENTERED. THIS ENTRY WILL BE IGNORED.

MTS WARNING 12091: DATA SET CREATOR SHOULD NOT BE ENTERED. THIS ENTRY WILL BE IGNORED.

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MTS WARNING 12092: INVALID NUMERIC FIELD FOR DATA SET CREATOR. THIS ENTRY WILL BE IGNORED.

MTS WARNING 12093: DATA SET CREATOR OUT OF TOLERANCE xxxx-xxxx THIS ENTRY WILL Be IGNORED.

MTS WARNING 12094: INVALID CODE FOR DATA SET CREATOR. THIS ENTRY WILL BE IGNORED.

MTS WARNING 12095: CANNOT CORRECT DATA SET CREATOR AFTER SCHEDULE USED FOR TEST. ENTRY WILL BE IGNORED.

MTS WARNING 12101: USED FLAG SHOULD NOT BE ENTERED. THIS ENTRY WILL BE IGNORED.

** MTS ERROR 12102: INVALID NUMERIC FIELD FOR USED FLAG. THIS TRANSACTION WILL NOT BE PROCESSED.

** MTS ERROR 12103: USED FLAG OUT OF TOLERANCE XXXX-XXXX THIS TRANSACTION WILL NOT BE PROCESSED.

** MTS ERROR 12104: INVALID CODE FOR USED FLAG. THIS TRANSACTION WILL NOT BE PROCESSED.

MTS WARNING 12111: FIRST LNS UPDATE TIME SHOULD NOT BE ENTERED. THIS ENTRY WILL BE IGNORED.

MTS WARNING 12121: FIRST LNS UPDATE DATE SHOULD NOT BE ENTERED. THIS ENTRY WILL BE IGNORED.

MTS WARNING 12131: LATEST UPDATE TIME SHOULD NOT BE ENTERED. THIS ENTRY WILL BE IGNORED.

MTS WARNING 12141: LATEST UPDATE DATE SHOULD NOT BE ENTERED. THIS ENTRY WILL BE IGNORED.

*** MTS ERROR 13000: "S3" APPLICATION NON-CRUISE SHIFT SPEED PATTERN CARD NOT ENTERED. THIS TRANSACTION WILL NOT BE PROCESSED.

**** MTS ERROR 13001: MORE THAN ONE "S3" APPLICATION NON-CRUISE SHIFT SPEED PATTERN CARD ENTERED. THIS TRANSACTION WILL NOT BE PROCESSED.

**** MTS ERROR 13002: DATA BASE ERROR--"S3" APPLICATION NON-CRUISE SHIFT SPEED PATTERN RECORD MISSING FROM DATA BASE SHIFT SCHEDULE. THIS TRANSACTION WILL NOT BE PROCESSED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

**** MTS ERROR 13003: DATA BASE ERROR--MORE THAN ONE "S3" APPLICATION NON-CRUISE SHIFT SPEED PATTERN RECORD FOR DATA BASE SHIFT SCHEDULE. THIS TRANSACTION WILL NOT BE PROCESSED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

** MTS ERROR 13022: INVALID NUMERIC FIELD FOR APPLICATION NON-CRUISE SPEED. THIS ENTRY WILL BE IGNORED,

** MTS ERROR 13023: APPLICATION NON-CRUISE SPEED OUT OF TOLERANCE XXXX-XXXX. THIS ENTRY WILL BE IGNORED.

MTS WARNING 13025: CANNOT CORRECT APPLICATION NON-CRUISE SPEED AFTER SCHEDULE USED FOR TEST. THIS ENTRY WILL BE IGNORED.

** MTS ERROR 14000: "S4" APPLICATION CRUISE SHIFT SPEED PATTERN CARD NOT ENTERED.

**** MTS ERROR 14001: MORE THAN ONE "S4" APPLICATION CRUISE SHIFT SPEED PATTERN CARD ENTERED. THIS TRANSACTION WILL NOT BE PROCESSED.

**** MTS ERROR 14002: DATA BASE ERROR--"S4" APPLICATION CRUISE SHIFT SPEED PATTERN RECORD MISSING FROM DATA BASE SHIFT SCHEDULE. THIS TRANSACTION WILL NOT BE PROCESSED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

**** MTS ERROR 14003: DATA BASE ERROR--MORE THAN ONE "S4" APPLICATION CRUISE SHIFT SPEED PATTERN RECORD FOR DATA BASE SHIFT SCHEDULE. THIS TRANSACTION WILL NOT BE PROCESSED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

** MTS ERROR 14022: INVALID NUMERIC FIELD FOR APPLICATION CRUISE SPEED. THIS ENTRY WILL BE IGNORED.

** MTS ERROR 14023: APPLICATION CRUISE SPEED OUT OF TOLERANCE. XXXX-XXXX. THIS ENTRY WILL BE IGNORED.

MTS WARNING 14025: CANNOT CORRECT APPLICATION CRUISE SPEED AFTER SCHEDULE USED FOR TEST. THIS ENTRY WILL BE IGNORED.

**** MTS ERROR 15002: DATA BASE ERROR--"S5" CALCULATED NON-CRUISE SHIFT SPEED PATTERN RECORD MISSING FROM DATA BASE SHIFT SCHEDULE. THIS TRANSACTION WILL NOT BE PROCESSED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.
**** MTS ERROR 15003: DATA BASE ERROR--MORE THAN ONE "S5" CALCULATED NON-CRUISE SHIFT SPEED PATTERN RECORD FOR DATA BASE SHIFT SCHEDULE. THIS TRANSACTION WILL NOT BE PROCESSED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

MTS WARNING 15021: CALCULATED MEAN NON-CRUISE SPEED SHOULD NOT BE ENTERED. THIS ENTRY WILL BE IGNORED.

** MTS ERROR 15022: INVALID NUMERIC FIELD FOR CALCULATED MEAN

NON-CRUISE SPEED. THIS ENTRY WILL BE IGNORED.

** MTS ERROR 15023: CALCULATED MEAN NON-CRUISE SPEED OUT OF TOLERANCE XXXX-XXXX. THIS ENTRY WILL BE IGNORED.

MTS WARNING 15025: CANNOT CORRECT CALCULATED MEAN NON-CRUISE SPEED AFTER SCHEDULE USED FOR TEST. THIS ENTRY WILL BE IGNORED.

MTS WARNING 15031: CALCULATED MEASURED NON-CRUISE SPEED SHOULD NOT BE ENTERED. THIS ENTRY WILL BE IGNORED.

** MTS ERROR 15032: INVALID NUMERIC FIELD FOR CALCULATED MEASURED NON-CRUISE SPEED. THIS ENTRY WILL BE IGNORED.

** MTS ERROR 15033: CALCULATED MEASURED NON-CRUISE SPEED OUT OF TOLERANCE XXXX-XXXX. THIS ENTRY WILL BE IGNORED.

MTS WARNING 15035: CANNOT CORRECT CALCULATED MEASURED NON-CRUISE SPEED AFTER SCHEDULE USED FOR TEST. THIS ENTRY WILL BE IGNORED.

**** MTS ERROR 16002: DATA BASE ERROR--"S6" CALCULATED CRUISE SHIFT SPEED PATTERN RECORD MISSING FROM DATA BASE SHIFT SCHEDULE. THIS TRANSACTION WILL NOT BE PROCESSED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

**** MTS ERROR 16003: DATA BASE ERROR--MORE THAN ONE "S6" CALCULATED CRUISE SHIFT SPEED PATTERN RECORD FOR DATA BASE SHIFT SCHEDULE. THIS TRANSACTION WILL NOT BE PROCESSED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

MTS WARNING 16021: CALCULATED MEAN CRUISE SPEED SHOULD NOT BE ENTERED. THIS ENTRY WILL BE IGNORED.

** MTS ERROR 16022: INVALID NUMERIC FIELD FOR CALCULATED MEAN CRUISE SPEED. THIS ENTRY WILL BE IGNORED.

** MTS ERROR 16023: CALCULATED MEAN CRUISE SPEED OUT OF TOLERANCE xxxx-xxxx. THIS ENTRY WILL BE IGNORED.

MTS WARNING 16025: CANNOT CORRECT CALCULATED MEAN CRUISE SPEED AFTER SCHEDULE USED FOR TEST. THIS ENTRY WILL BE IGNORED.

MTS WARNING 16031: CALCULATED MEASURED CRUISE SPEED SHOULD NOT BE ENTERED. THIS ENTRY WILL BE IGNORED.

** MTS ERROR 16032: INVALID NUMERIC FIELD FOR CALCULATED MEASURED CRUISE SPEED. THIS ENTRY WILL BE IGNORED.

** MTS ERROR 16033: CALCULATED MEASURED CRUISE SPEED OUT OF TOLERANCE xxxx-xxxx. THIS ENTRY WILL BE IGNORED.

MTS WARNING 16035: CANNOT CORRECT CALCULATED MEASURED CRUISE SPEED AFTER SCHEDULE USED FOR TEST. THIS ENTRY WILL BE IGNORED.

** MTS ERROR 17000: "S7" DRIVING SCHEDULE NAME CARD NOT ENTERED.

**** MTS ERROR 17001: NUMBER OF "S7" DRIVING SCHEDULE NAME CARDS EXCEEDS PROGRAM LIMIT (6). THIS TRANSACTION WILL NOT BE PROCESSED.

**** MTS ERROR 17002: DATA BASE ERROR--"S7" DRIVING SCHEDULE NAME RECORD MISSING FROM DATA BASE SHIFT SCHEDULE. THIS TRANSACTION WILL NOT BE PROCESSED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

**** MTS ERROR 17003: DATA BASE ERROR--MORE THAN SIX "S7" DRIVING SCHEDULE NAME RECORDS FOR DATA BASE SHIFT SCHEDULE. THIS TRANSACTION WILL NOT BE PROCESSED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

** MTS ERROR 17020: DRIVING SCHEDULE NAME CODE NOT ENTERED.

MTS WARNING 17021: DRIVING SCHEDULE NAME CODS SHOULD NOT BE

ENTERED. THIS ENTRY WILL BE IGNORED..

** MTS ERROR 17022: INVALID NUMERIC FIELD FOR DRIVING SCHEDULE NAME CODE SPEED. THIS ENTRY WILL BE IGNORED..

** MTS ERROR 17023: DRIVING SCHEDULE NAME CODE OUT OF TOLERANCE XXXX-XXXX THIS ENTRY WILL BE IGNORED..

** MTS ERROR 17024: INVALID CODE FOR DRIVING SCHEDULE NAME CODE SPEED. THIS ENTRY WILL BE IGNORED..

MTS WARNING 17025: CANNOT CORRECT DRIVING SCHEDULE NAME CODE AFTER SCHEDULE USED FOR TEST. THIS ENTRY WILL BE IGNORED.

** MTS ERROR 18000: "S8" CERTIFICATION MODEL YEAR CARD NOT ENTERED.

**** MTS ERROR 18001: NUMBER OF "S8" CERTIFICATION MODEL YEAR CARDS EXCEEDS PROGRAM LIMIT (12). THIS TRANSACTION WILL NOT BE PROCESSED.

**** MTS ERROR 18003: DATA BASE ERROR--MORE THAN TEN "S8" CERTIFICATION MODEL YEAR RECORDS FOR DATA BASE SHIFT SCHEDULE. THIS TRANSACTION WILL NOT BE PROCESSED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

* MTS ERROR 18020: CERT MODEL YEAR NOT ENTERED.

MTS WARNING 18021: CERT MODEL YEAR SHOULD NOT BE ENTERED. THIS ENTRY WILL BE IGNORED.

MTS WARNING 18022: INVALID NUMERIC FIELD FOR CERT MODEL YEAR. THIS ENTRY WILL BE IGNORED.

MTS WARNING 18023: CERT MODEL YEAR OUT OF TOLERANCE XXXX-XXXX THIS ENTRY WILL BE IGNORED.

*** MTS ERROR 18025: CANNOT DELETE MODEL YEAR AFTER SCHEDULE USED FOR CERT TEST. THIS ENTRY WILL BE IGNORED.

**** MTS ERROR 20003: DATA BASE ERROR--MORE THAN 25 "SA" LNS ERROR MESSAGE RECORDS FOR DATA BASE SHIFT SCHEDULE. THIS TRANSACTION WILL NOT BE PROCESSED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

**** MTS ERROR 21003: DATA BASE ERROR--MORE THAN 25 "SB" MTS ERROR MESSAGE RECORDS FOR DATA BASE SHIFT SCHEDULE. THIS TRANSACTION WILL NOT BE PROCESSED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

**** MTS ERROR 22003: DATA BASE ERROR--MORE THAN 10 "SC" COMMENT RECORDS FOR DATA BASE SHIFT SCHEDULE. THIS TRANSACTION WILL NOT BE PROCESSED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

**** MTS ERROR 30001: NUMBER OF "SP" SHIFT POINT CARDS EXCEEDS PROGRAM LIMIT (160). THIS TRANSACTION WILL NOT BE PROCESSED.

**** MTS ERROR 30003: DATA BASE ERROR--MORE THAN 160 "SP" SHIFT POINT RECORDS FOR DATA BASE SHIFT SCHEDULE. THIS TRANSACTION WILL NOT BE PROCESSED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

**** MTS ERROR 30004: DATA BASE ERROR--I/O ERROR ATTEMPTING TO READ THE NUMBER OF SHIFT POINTS IN A DATA BASE SHIFT POINT RECORD. THIS TRANSACTION WILL NOT BE PROCESSED. PLEASE SHOW THIS TO SOMEONE IN THE EPA CERTIFICATION DIVISION COMPUTER SUPPORT SECTION.

* MTS WARNING 30020: SHIFT POINT NUMBER NOT ENTERED FOR CORRECITON OR CHANGE. THIS SHIFT POINT WILL BE IGNORED.

MTS WARNING 30021: SHIFT POINT NUMBER SHOULD NOT BE ENTERED. SHIFT POINT NUMBER WILL BE IGNORED.

** MTS ERROR 30022: INVALID NUMERIC FIELD FOR SHIFT POINT NUMBER. THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30023: SHIFT POINT NUMBER OUT OF TOLERANCE XXXX-XXXX THIS SHIFT POINT WILL BE IGNORED.

MTS WARNING 30025: CANNOT DELETE SHIFT POINT NUMBER AFTER SCHEDULE USED FOR TEST. THIS ENTRY WILL BE IGNORED.

** MTS ERROR 30030: SHIFT TIME NOT ENTERED. THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30031: SHIFT TIME SHOULD NOT BE ENTERED. THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30032: INVALID NUMERIC FIELD FOR SHIFT TIME. THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30033: SHIFT TIME OUT OF TOLERANCE XXXX-XXXX THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30034: INVALID CODE FOR SHIFT TIME. THIS TRANSACTION WILL NOT BE PROCESSED.

** MTS ERROR 30040: SHIFT SPEED NOT ENTERED.

MTS WARNING 30041: SHIFT SPEED SHOULD NOT BE ENTERED. SHIFT SPEED WILL BE IGNORED.

** MTS ERROR 30042: INVALID NUMERIC FIELD FOR SHIFT SPEED. THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30043: SHIFT SPEED OUT OF TOLERANCE XXXX-XXXX THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30050: SHIFT ACTION CODE NOT ENTERED. THIS SHIFT POINT WILL BE IGNORED.

MTS WARNING 30051: SHIFT ACTION CODE SHOULD NOT BE ENTERED. SHIFT ACTION WILL BE IGNORED.

** MTS ERROR 30052: INVALID NUMERIC FIELD FOR SHIFT ACTION CODE. THIS SHIFT POINT WILL BE IGNORED..

** MTS ERROR 30053: SHIFT ACTION CODE OUT OF TOLERANCE XXXX-XXXX THIS SHIFT POINT WILL BE IGNORED..

** MTS ERROR 30054: INVALID CODE FOR SHIFT ACTION CODE. THIS SHIFT POINT WILL BE IGNORED..

*** MTS ERROR 30055: CANNOT DELETE SHIFT ACTION CODE AFTER

SCHEDULE USED FOR TEST. THIS TRANSACTION WILL NOT BE PROCESSED.

** MTS ERROR 30060: SHIFT POINT COMMENT NOT ENTERED. THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30061: SHIFT POINT COMMENT SHOULD NOT BE ENTERED. THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30065: CANNOT DELETE SHIFT POINT COMMENT AFTER SCHEDULE USED FOR TEST. THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30070: SHIFT MARK (H/V) NOT ENTERED. THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30071: SHIFT MARK (H/V) SHOULD NOT BE ENTERED. THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30074: INVALID CODE FOR SHIFT MARK (H/V). THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30075: CANNOT DELETE SHIFT MARK (H/V) AFTER SCHEDULE USED FOR TEST. THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30080: SHIFT MARX (L/R) NOT ENTERED. THIS SHIFT POINT WILL BE IGNORED.

MTS ERROR 30081: SHIFT MARK (L/R) SHOULD NOT BE ENTERED. THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30084: INVALID CODE FOR SHIFT MARK (L/R). THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30085: CANNOT DELETE SHIFT MARK (L/R) AFTER SCHEDULE USED FOR TEST. THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30090: EXCEPTION POINT NOT ENTERED. THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30091: EXCEPTION POINT SHOULD NOT BE ENTERED. THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30094: INVALID CODE FOR EXCEPTION POINT. THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30095: CANNOT DELETE EXCEPTION POINT AFTER SCHEDULE USED FOR TEST. THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30100: CRUISE POINT NOT ENTERED. THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30101: CRUISE POINT SHOULD NOT BE ENTERED. THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30104: INVALID CODE FOR CRUISE POINT. THIS SHIFT POINT WILL BE IGNORED.

** MTS ERROR 30105: CANNOT DELETE CRUISE POINT AFTER SCHEDULE USED FOR TEST. THIS SHIFT POINT WILL BE IGNORED.

Blank page to force the data sheet on the next to begin with an odd page number.

PAGE XIII-37 = FILE CD8713_2.PCX

PAGE XIII-38 = FILE CD8713_3.PCX

PAGE XIII-39 = FILE CD8713_4.PCX

PAGE XIII-40 = FILE CD8713_5.PCX

SSIS

Attachment XIII-2 --Examples:

An example is provided below that illustrates the input data and reports for one shift schedule submitted by a manufacturer. The reports include a preliminary report and a final LNS report.

Example Shift Schedule Data Set Submitted by a Manufacturer

Column 1

```
S1         777      TMW 4-SPEED FTP SCHEDULE
S2                1
S3 15.0 15.0 25.0 40.0 45.0  0.0
S4 15.0 15.0 25.0 40.0 45.0  0.0
S7   2
S8 1988
S8 1989
S8 1990
SC TASMANIA MOTOR WORKS 4-SPEED SHIFT SCHEDULE
SP  1    25.3     12
SP  2    27.0     23
SP  3    120.2    30
SP  4    167.6    12
SP  5    171.5    23
SP  6    187.0    32
SP  7    192.2    23
SP  8    198.6    44
```

```
SP  9    202.0    45
SP 10    327.2    50
SP 11    351.3    12
SP 12    355.9    23
SP 13    391.9    30
SP 14    406.8    12
SP 15    410.0    23
SP 16    424.1    30
SP 17    451.6    12
SP 18    454.6    23
SP 19    499.5    30
SEND
```


PAGES XIII-42 THROUGH -45 = FILES CD8713_6.PCX THROUGH CD8713_9.PCX, RESPECTIVELY.

ENCLOSURE II

Revised Vehicle Information Data Sheet

The Vehicle Information Data Sheet (VIDS) is revised to include new fields for Shift Schedule Identification Number on input Card 5, columns 69-72 for City and columns 73-76 for Highway. The Shift Schedule Identification Number is assigned when unique shift pattern information is entered into the Shift Schedule Information Sheet Program. Users can enter Shift Schedule Identification Numbers on the VIDS to specify which unique shift schedules should be used during testing.

Default standard shift patterns will be determined by the Vehicle Information computer program if Shift Schedule Identification Number fields are left blank. The following criteria will be used to determine the default shift patterns from the information entered in the Shift Speed Code and Transmission Configuration fields entered on V.I. sheet

Shift Speed Code	Transmission Configuration	Shift Schedule Id #
1 (15-25-40-45)	0 (C-4)	FT3 (City) HW3 (Hwy)
same	2 (M-3)	FT3 (City) HW3 (Hwy)
same	3 (M-4)	FT4 (City) HW4 (Hwy)
same	4 (M-5)	FT5 (City) HW5 (Hwy)
same	l0 (C-5)	FT4 (City) HW4 (Hwy)
6 (Shift Indicator Light)	0,2,3,4,10 (C or M designator)	SIL
(blank)	6,7,8,9 (Automatic)	AUT

Certification Division Vehicle Information Data Sheet 1987 & Later =
FILE CD871310.PCX AND CD871311.PCX